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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/801,740
Filing Date: March 16, 2004
Appellant(s): KEEGAN ET AL.

Dennis B. Danella
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 8/31/09 appealing from the Office action mailed 3/30/09.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2002/0071974 A1	Yamaoka	6-2002
2003/0101713 A1	Dalla Betta	6-2003

2002/0150532 A1 Grieve 10-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-5 and 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalla Betta (US 2003/0101713) in view of Yamaoka (US 2002/0071974).

Regarding claims 1, 2, 10, 11, 15, and 16, Dalla Betta discloses the use of fuel type, flow rate, catalyst mass, heat of combustion (paragraph 95), and initial temperature of said catalyst (paragraph 55) and other system constants (see paragraph 78 for heat capacity of the reformer mass) for use in length of time for fuel processing (paragraph 101) and preheating to a minimum reforming temperature (paragraph 52). And while Dalla Betta discloses the use of control systems, the reference does not disclose the details of a software construct, a computing system, or computer readable medium.

Yamaoka discloses a fuel reforming apparatus with an electronic control module for controlling the flow of hydrocarbon fuel and air into the reformer and pre-heating from a starting temperature to a minimum reforming temperature (paragraph 10). Yamaoka discloses the use of a microcomputer (paragraph 39). Software constructs including algorithms, code modules, and interface specifications are inherent to all computers, as are the computer readable medium located within them and with which they function. Computers and their inherent software constructs are the most common methods for control in the art. Yamaoka does not explicitly disclose determining a fuel combustion time interval for the pre-heating. However, given that a target temperature

setting means and quantity determinator is disclosed by Yamaoaka (paragraph 15) and time is measures (figure 6), it would have been obvious to one having ordinary skill in the art at the time of invention to measure the time necessary heating the raw fuel to a reformer temperature in Dalla Betta using the computer of Yamaoka to compensate for the time necessary for the process to occur given the quantity of fuel used and target temperature desired via Yamaoka.

Regarding claims 3, 4, 12, 13, 17, and 18, Dalla Betta does not disclose the specifics of the function involving the various parameters. Yamaoka, however, discloses a linear function of temperature and flow rate (see figure 2) where y is the target temperature (combustion temperature) and b is the starting temperature (y-intercept). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a software construct with a linear form since the heat of combustion and heat capacity and mass of the catalyst are all constant: If m is an integral of a product of the latent heat of combustion of said fuel times the selected flow rate of said fuel, divided by a product of the mass of said reformer to be heated times the heat capacity of said mass, the integral of these values with the flow rate of the combustion fuel is equal to the product of the latent heat of combustion divided by a product of the mass of said reformer to be heated times the heat capacity of said mass times the integral of the flow rate with respect to time (it is the only variable related to time). This also gives an x value that is the quantity of raw fuel flow, as the graph of figure 2 is labeled. The use of these variables as products and dividends as a slope converts the

units of flow rate to the units of temperature with a value dependent upon the specific values of the gas and catalyst—obvious to a person of ordinary skill.

Regarding claims 5, 14, and 19, Dalla Betta discloses a reforming temperature of about 500°C (paragraph 54).

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka (US 2002/0071974).

Yamaoka discloses a fuel reforming apparatus with an electronic control module for controlling the flow of hydrocarbon fuel and air into the reformer and pre-heating from a starting temperature to a minimum reforming temperature (paragraph 10). Yamaoka discloses the use of a microcomputer (paragraph 39). Software constructs including algorithms, code modules, and interface specifications are inherent to all computers. Yamaoka does not explicitly disclose determining a fuel combustion time interval for the pre-heating. However, given that a target temperature setting means and quantity determinator is disclosed by Yamaoaka (paragraph 15), time is measured (figure 6), and the importance of the catalyst temperature is recognized (paragraph 2), it would have been obvious to one having ordinary skill in the art at the time of invention use a software construct to measure the time necessary for heating the catalyst to a reformer temperature to compensate for the time necessary for the process to occur given the quantity of fuel used, the target temperature desired, and the activation temperature of the catalyst.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka as applied to claim 6 above, and further in view of Dalla Betta.

Yamaoka discloses a linear function of temperature and flow rate (see figure 2) where y is the target temperature (combustion temperature) and b is the starting temperature (y-intercept). Yamaoka does not, however, disclose the details of the slope. Dalla Betta discloses the use of fuel type, flow rate, catalyst mass, heat of combustion, and initial temperature (paragraph 95) and other system constants (see paragraph 78 for heat capacity of the reformer mass) for use in length of time for fuel processing (paragraph 101). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a software construct with a linear form since the heat of combustion and heat capacity and mass of the catalyst are all constant: If m is an integral of a product of the latent heat of combustion of said fuel times the selected flow rate of said fuel, divided by a product of the mass of said reformer to be heated times the heat capacity of said mass, the integral of these values with the flow rate of the combustion fuel is equal to the product of the latent heat of combustion divided by a product of the mass of said reformer to be heated times the heat capacity of said mass times the integral of the flow rate with respect to time (it is the only variable related to time). This also gives an x value that is the quantity of raw fuel flow, as the graph of figure 2 is labeled. The use of these variables as products and dividends as a slope converts the units of flow rate to the units of temperature with a value dependent upon the specific values of the gas and catalyst—obvious to a person of ordinary skill.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka as applied to claim 6 above, and further in view of Grieve (US 2002/0150532).

Yamaoka discloses the use of a fuel cell, but does not disclose a solid oxide fuel cell. Grieve, however, does (paragraph 4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a solid oxide fuel cell with Yamaoka as it would be capable of the same function as Yamaoka and is a common type of fuel cell readily available in the art.

(10) Response to Argument

In regards to Issue 1:

Appellant argues on pages 9-17 that claims 6 and 7 are not obvious in view of the Yamaoka reference. Examiner respectfully disagrees.

The main arguments presented by Appellant, as interpreted by the Examiner, relate to the fact that Yamaoka discloses measuring means for and importance of the fuel temperature but that these do no relate to the starting temperature of the catalyst within the reformer. And while the Examiner has stated that it would have been obvious to determine the fuel combustion time interval, the present invention claims a software construct that does so.

It is important to note the actual language used in claim 6. The claim does not state that the starting temperature of the catalyst in the reformer is measured. The claim simply states that "the fuel combustion time interval is at least dependent on a starting temperature of a catalyst in said reformer." Yamaoka, meanwhile, as stated in the rejection above, discloses both the measuring of the time necessary for temperature changes in the fuel (paragraph 50) and that these temperatures and times are related to the catalyst temperature (paragraph 8). Paragraph 2, an area of Yamaoka that the

Appellant has asserted provides no more information than their own specification, discloses the relation between catalyst temperature and fuel temperature.

Given the extensive use of control in Yamaoka, and the use of a micro-computer, software constructs are inherent to Yamaoka as described in the rejection above. What is not disclosed by Yamaoka, and why the rejection is an obviousness-type rejection, is whether the time interval for determining fuel combustion time is measured. What is certain is that this time relates to the catalyst temperature and that Yamaoka measures and calculates times necessary for fuel to reach its desired temperature and the catalyst to reach its activating temperature (paragraph 8). It then is obvious to one having ordinary skill in the art at the time of invention to use the control, computer, and software of Yamaoka to determine the fuel combustion time interval. This time interval, at least in part, depends upon the temperature of the catalyst (paragraph 50). And knowing how long the reaction will take to occur is fundamental to successful operation of the process. Declaring these claims novel or nonobvious would provide exclusive rights for a process that is fundamental to all types of its ilk. This process is obvious in view of Yamaoka and with knowledge of ordinary skill in the art.

In regards to Issue 2:

Appellant argues on pages 17-23 or the Appeal Brief that independent claims 1, 10, and 15, as well as their dependents, fail to be properly rejected by the Dalla Betta reference in view of the Yamaoka reference. Examiner respectfully disagrees.

Firstly, the assertion that Dalla Betta does not disclose step f of the claims: "determining said starting temperature of said catalyst in said catalytic reformer."

Attention is directed towards figure 4 and paragraph 55 of the Dalla Betta reference. As paragraph 55 clearly states, line **408** in figure 4 is the temperature of the reforming catalyst over time. The graph of figure 4 indicates a starting temperature of the reforming catalyst and paragraph 84 describes means with which to monitor temperature of the reforming catalyst. Furthermore, as one of ordinary skill in aware, the starting temperature of the catalyst is crucial in determining when and if the catalyst has achieved the desired temperature necessary for reforming to occur, which Dalla Betta discloses the importance of, as well (paragraph 64). Notice also that the dependent axis of the graph in figure 4 is time so clearly time is being measured.

Secondly, Appellant asserts on page 20 that "the Examiner appears to be taking the position that since the starting temperature of the gas at the outlet of the reformer catalyst is shown in the graph of Figure 8B of the Dalla reference, these starting temperatures are used in a software construct to determine a fuel combustion time interval for pre-heating the reformer catalyst." Examiner respectfully disagrees with this assertion as this is not the Examiner's position. In the grounds for rejection section, Examiner has stated that the Dalla Betta reference does not disclose a software construct. The lack of the software construct is the impetus for the combination with the Yamaoka reference: to provide motivation for a software construct. The Dalla Betta reference provides reasons for measuring and monitoring all of the relevant characteristics of the claimed method, as well as stating the importance of catalyst temperature. The Yamaoka reference—analogous art for the reasons provided in the rejection—provides details of a software construct. As the rejection states, it is obvious

for one having ordinary skill in the art to use a software construct to perform the task of Della Betta. As stated in the Advisory Action mailed on 6/17/09, calculating the time necessary for the reforming catalyst to reach its activation temperature, and using an automated process to do so, is obvious. As one of ordinary skill is well aware, the starting temperature of anything has to be taken into account when determining the change in temperature. And according to MPEP 2144.04 III, automation of a manual activity is not grounds for patentability. Deeming these claims novel or nonobvious would countermand ubiquitous calculations that have been occurring in chemistry since the advent of calculation and computing.

In regards to Issue 3:

Claim 8 is not argued by Appellant separately from the arguments directed to claim 6, which have been responded to above.

In regards to Issue 4:

Claim 9 is not argued by Appellant separately from the arguments directed to claim 6, which have been responded to above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Imran Akram/

Examiner, Art Unit 1795

Conferees:

/Jennifer K. Michener/

Supervisory Patent Examiner, Art Unit 1795

/Anthony McFarlane/